

PHILADELPHIA WATER DEPARTMENT

1991

ANNUAL REPORT



WATER POLLUTION SOLUTION:

" I WOULD

GET A SPECIAL

ROBOT TO

CLEAN IT UP.

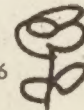
THE ROBOT

WOULD HAVE

120 HANDS

AND 120 EYES."

CHRIS, AGE 6



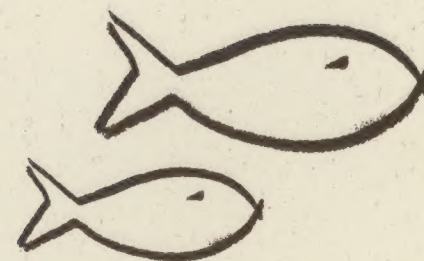


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THE ARGUMENT FOR CLEAN WATER



HIS ISSUE OF THE PHILADELPHIA WATER DEPARTMENT'S 1991 ANNUAL REPORT IS PUNCTUATED BY ESSAYS WRITTEN BY THE 5TH AND 6TH GRADERS OF THE BRIDESBURG ELEMENTARY SCHOOL. THE WATER DEPARTMENT ADOPTED BRIDESBURG ELEMENTARY BACK IN 1989, AND SINCE THAT TIME, WE HAVE GAINED A FRESH PERSPECTIVE OF WHY KIDS ARE CONCERNED ABOUT THE ENVIRONMENT.



WE HAVE LEARNED FROM THE BRIDESBURG STUDENTS THAT WHEN THEY THINK OF THE ENVIRONMENT, THEY THINK ABOUT THE ANIMALS AND PLANTS THAT THEY SEE LIVING IN THEIR NEIGHBORHOOD OR PLACES THEY HAVE VISITED. THEY HAVE SEEN DEAD FISH IN A STREAM FILLED WITH FLOATING TRASH AND NEIGHBORHOOD GARDENS MARRED BY LITTER. THEIR PARENTS AND GRANDPARENTS TELL THEM ABOUT HOW THE NEIGHBORHOOD WAS ONCE SO CLEAN AND BEAUTIFUL, AND THE KIDS WANT TO SEE IT THAT WAY AGAIN. THEY WANT TO LIVE IN A PRETTY ENVIRONMENT TOO.

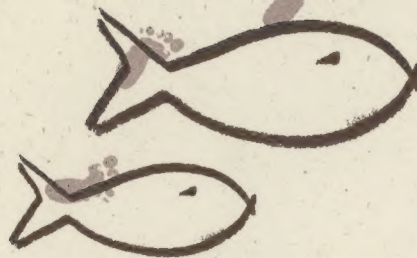


AND THE STUDENTS ARE WORRIED BECAUSE THEY DIDN'T MAKE THE EARTH THIS WAY. THE CIGARETTE BUTTS LITTERING THE STREETS DON'T BELONG TO THEM.

THEY'RE NOT MAKING THE PLASTIC BAGS OR STYROFOAM CUPS THAT ARE FILLING UP THE LANDFILLS. THEY'RE NOT DRIVING THE CARS THAT COUGH OUT A TERRIBLE BLACK SMOKE WHEN STARTED UP. AND THAT'S WHY THE KIDS TURN TO THEIR PARENTS, TO THE ADULTS, WITH THEIR COMPLAINTS ABOUT HOW WE'RE DIRTYING THEIR WORLD, URGING US TO RECYCLE, TO CLEAN UP OUR NEIGHBORHOODS, TO DRIVE ELECTRIC CARS, TO STOP THE POLLUTION.




RECENTLY, THE 5TH AND 6TH GRADERS OF BRIDESBURG ELEMENTARY TOURED THE WATER DEPARTMENT'S BAXTER WATER TREATMENT PLANT IN THE TORRESDALE SECTION OF THE CITY. THE STUDENTS WERE ENTHRALLED BY THE WATER TREATMENT PROCESS, ONE STUDENT GOING SO FAR AS CLAIMING THE TOUR WAS THE BEST TRIP I'VE EVER BEEN ON." LATER THEY WROTE DOWN THEIR REACTIONS TO THE TOUR, AND THEIR THOUGHTS CONCERNING THE IMPORTANCE OF CLEAN WATER. THEIR ESSAYS AND POEMS ARE SIMPLE YET COMPLETE.





**THERE WAS AN OLD WOMAN
WHO LIVED IN A SHOE.
SHE HAD NO WATER,
SHE DIDN'T KNOW WHAT TO DO,
SO SHE:**

WISHED FOR RAIN,
DUG DEEP IN THE GROUND,
MELTED SLURPEES,
BROKE OPEN LEAVES,
SIPPED SAP FROM A TREE,
GATHERED DEW DROPS FROM GRASS,
SQUEEZED LEMONS,
OPENED COCONUTS
MILKED A COW
MELTED ICE CUBES
CHEWED JUICY GUM
WENT TO THE NORTH POLE AND
BROUGHT BACK ICE CHUNKS
SIPPED HONEYSUCKLES
ATE SNOW
ASKED HER CHILDREN TO CRY TEARDROPS
PLANTED WATERMELON SEEDS
MADE METAL OBJECTS COLD

AMANDA, AGE 7 

THE VALUE OF CLEAN DRINKING WATER



WATER BILLS ARE HIGH WHEN FIGURED INTO THE FAMILY BUDGET, AND THE PRICE THE CUSTOMER IS PAYING INCLUDES THE COST OF TREATING THE WATER TO MAKE IT SAFE TO DRINK, THE COST OF CLEANING THE WASTEWATER THAT THE CUSTOMER HAS FINISHED WITH, AND THE COST OF RECYCLING THE SLUDGE REMOVED FROM THE CUSTOMER'S WASTEWATER. WE TEND TO FORGET THAT AS A NATION, WE HAVE DIRTIED OUR WATER RESOURCES MUCH FASTER THAN WE HAVE WORKED TO CLEAN THEM UP, AND THUS WE MUST SPEND ACCORDINGLY. BUT ON ANOTHER LEVEL, WATER IS ESSENTIAL TO THE EXISTENCE OF HUMANITY AND THE WORLD WE KNOW, THUS MAKING IT A PRICELESS COMMODITY. ADAM SMITH, THE FAMOUS 18TH CENTURY ECONOMIST, IN HIS CLASSIC WORK, **THE WEALTH OF NATIONS**, PONDERED THE VALUE OF WATER WITH THIS COMPARISON, "HOW IS IT THAT WATER, WHICH IS SO VERY USEFUL THAT LIFE IS IMPOSSIBLE WITHOUT IT, HAS SUCH A LOW PRICE - WHILE DIAMONDS, WHICH ARE QUITE UNNECESSARY, HAVE A HIGH PRICE?" AS A RESOURCE, WATER HAS TRADITIONALLY BEEN UNDERVALUED.

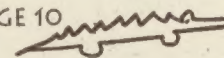
ALL OF US TAKE FOR GRANTED THE READY SUPPLY OF GOOD CLEAN DRINKING WATER THAT FLOWS FROM OUR FAUCETS WITH A SIMPLE TURN OF A TAP. YOUR FAUCET IS CONNECTED TO YOUR WATER SERVICE WHICH IS CONNECTED TO THE WATER MAIN IN YOUR STREET WHICH IS CONNECTED TO A WATER TREATMENT PLANT WHICH PUMPS WATER FROM ONE OF PHILADELPHIA'S RIVERS.

THE BAXTER WATER TREATMENT PLANT IN THE TORRESDALE SECTION OF THE CITY DRAWS FROM THE DELAWARE RIVER AND SERVES ABOUT 55 PERCENT OF THE CITY'S POPULATION, MOSTLY RESIDENTS OF THE NORTHEAST AND CENTER CITY. THE QUEEN LANE PLANT, IN EAST FALLS, AND THE BELMONT WATER TREATMENT PLANT, IN WEST PHILADELPHIA, TREAT WATER FROM THE SCHUYLKILL RIVER. THE SOURCES TO BOTH RIVERS BEGIN HUNDREDS OF MILES UPSTREAM - THE HEADWATERS OF THE DELAWARE RIVER IN NEW YORK AND THE SCHUYLKILL ABOVE READING, PA. MORE THAN 1.7 MILLION PEOPLE ARE THE RECIPIENTS OF ABOUT 358 MILLION GALLONS OF WATER THAT PHILADELPHIA PURIFIES EVERY DAY.



WHEN I FIRST ARRIVED AT THE WATER
TREATMENT PLANT I THOUGHT IT
WOULD BE A BORING TRIP. IT SEEMED I
WAS WRONG BECAUSE IT WAS AN
INTERESTING TRIP. SOME OF THE
THINGS I LIKED WAS GOING ON THE
ROOF AND LOOKING OUT AND
WATCHING THE WATER BEING
CLEANED. IT WAS ALSO FUN TO
LOOK INTO THE OCTAGON-SHAPED
WELL COVERED WITH GLASS. I
LEARNED ABOUT HOW THEY CLEAN
WATER AND HOW THEY KEEP THE
CHEMICALS THAT GO INTO THE
WATER UNDER CONTROL.

JACQUELYN, AGE 10



THE VALUE OF CLEAN DRINKING WATER



ENJAMIN FRANKLIN WAS ATTRIBUTED WITH SAYING, "ONLY WHEN THE WELL RUNS DRY DO WE KNOW THE WORTH OF WATER." AS A RESOURCE, IT IS PRICELESS. AS A COMMODITY, IT IS EXPENSIVE TO TREAT AND DELIVER.

TREATMENT TAKES PLACE AT THE CITY'S THREE PLANTS. RIVER WATER IS DRAWN INTO THE PLANTS' "RAW WATER" RESERVOIRS, WHERE IT IS HELD FOR A PERIOD TO ALLOW PARTICLES SUCH AS TWIGS, LEAVES, RIVER SEDIMENT AND BACTERIA TO SETTLE TO THE BOTTOM. FROM THE RESERVOIRS IT FLOWS DOWNHILL THROUGH A SHAFT WHERE CHLORINE IS APPLIED TO KILL HARMFUL ORGANISMS. OTHER CHEMICALS ADDED INCLUDE: ALUM WHICH IS A COAGULANT THAT WHEN IN WATER ATTRACTS IMPURITIES LIKE A MAGNET. THIS SUBSTANCE BECOMES "FLOC" AND ALSO SETTLES OUT. LIME MAY BE ADDED TO ADJUST THE ACIDITY, OR "PH" OF THE WATER AND TO AID IN CORROSION CONTROL. ACTIVATED CARBON MAY BE ADDED TO CONTROL TASTE AND ODOR. AMMONIA IS ADDED TO FACILITATE THE CHLORINE AND AID WITH TASTE AND ODOR.

AFTER THE CHEMICALS ARE APPLIED, THE WATER IS VIGOROUSLY MIXED AS IT FLOWS TOWARDS THE FLOCCULATION AND SEDIMENTATION BASINS. THE WATER IS THEN SLOWLY MIXED TO ENCOURAGE THE "FLOC" TO ABSORB ONE ANOTHER. THE GROWING WEIGHT OF THE FLOC CAUSES IT TO SINK TO THE BOTTOM OF THE SEDIMENTATION BASINS.

FROM THE BASINS THE WATER FLOWS DOWNWARD THROUGH FILTERS COMPOSED OF LAYERS OF COAL, SAND AND GRAVEL OF VARYING GRADES, REMOVING THE REMAINING IMPURITIES. FLUORIDE IS ADDED FOR DENTAL PROTECTION BEFORE THE WATER IS DISTRIBUTED FOR DRINKING.

THE SAFE DRINKING WATER ACT IS THE FEDERAL LAW WHICH PRESCRIBES THE MAXIMUM LEVEL OF CONTAMINANTS ALLOWED IN DRINKING WATER. PHILADELPHIA'S DRINKING WATER IS SAMPLED AT 85 DIFFERENT LOCATIONS EVERY DAY THROUGHOUT THE DISTRIBUTION NETWORK. PHILADELPHIA'S WATER HAS ALWAYS ACHIEVED A QUALITY ABOVE AND BEYOND DEFINITION UNDER FEDERAL LAW.



ON MY TRIP TO THE WATER TREATMENT PLANT I
LEARNED HOW THE WATER GOT CLEAN. WE WENT
UP ON THE ROOF. THERE WAS WATER EVERYWHERE.
ON THE GROUND THERE WERE BIG TANKS WITH LOTS
OF WATER IN THEM. I LIKED IT WHEN THEY CLEANED
THE WATER FOR US. I LEARNED A LOT ABOUT WATER.
AT THE END OF OUR VISIT WE GOT BOOKS ABOUT
WATER. SOME OF THE THINGS I LEARNED WAS THAT
OUR WATER COMES FROM THE DELAWARE RIVER. THEY
USE BIG MACHINES TO FILTER AND PURIFY THE WATER.
THE WATER IS FILTERED TO MAKE IT PURE BEFORE IT
COMES TO OUR HOUSES.

MICHELLE, GRADE 5





AS THE PHILADELPHIA WATER DEPARTMENT MOVES INTO THE CENTURY'S LAST DECADE IT FACES MANY CHALLENGES. HUNDREDS OF NEWLY REGULATED CONTAMINANTS IN DRINKING WATER, AT NEAR ZERO LEVELS, WILL TEST OUR ABILITY TO PROVIDE THE HIGHEST QUALITY DRINKING WATER AT REASONABLE RATES. UNDER THE 1986 AMENDED SAFE DRINKING WATER ACT (SDWA), MORE THAN 100 NEW REGULATIONS ARE ANTICIPATED BY WATER UTILITIES BY 1995.

CONTAMINANTS IN DRINKING WATER ARE REGULATED THROUGH STANDARDS CALLED MAXIMUM CONTAMINANT LEVELS (MCLs) AND THE NON-ENFORCEABLE, HEALTH BASED MAXIMUM CONTAMINANT LEVEL GOALS (MCLGs). MCLs ARE ESTABLISHED AS A BALANCE BETWEEN ASSUMED HEALTH RISK AND ANALYTICAL, TECHNOLOGICAL AND ECONOMIC FEASIBILITY. MCLGs REPRESENT THE LEVEL AT WHICH NO KNOWN ADVERSE HEALTH EFFECTS EXIST. SECONDARY MAXIMUM CONTAMINANT LEVELS (SMCLs) REPRESENT AESTHETIC STANDARDS AND ARE UNENFORCEABLE AT THE FEDERAL LEVEL BUT ARE ENFORCEABLE IN PENNSYLVANIA.

CONTAMINANTS IN DRINKING WATER ARE GENERALLY CATEGORIZED AS MICROBIAL, RADIONUCLIDES, INORGANIC OR ORGANIC. MICROBIAL CONTAMINATION IS REGULATED THROUGH THE SURFACE WATER TREATMENT RULE, THE TOTAL COLIFORM RULE, AND VARIOUS OTHER STANDARDS. RADIONUCLIDES SUCH AS RADON ARE REGULATED UNDER THE RADIONUCLIDE RULE.

INORGANIC CONTAMINANTS (IOCS) INCLUDE ASBESTOS, FLUORIDE, ARSENIC, SODIUM, LEAD AND COPPER. ORGANIC CONTAMINANTS ARE TYPICALLY MAN-MADE COMPOUNDS AND ARE CALLED SOCS. THEY INCLUDE PESTICIDES, INDUSTRIAL SOLVENTS, AND PCBS.

THE LEAD RULE



HOWEVER, 1991 WAS DOMINATED BY THE ENVIRONMENTAL PROTECTION AGENCY'S (EPA) NEW RULINGS ON LEAD AND COLIFORM MONITORING. THE WATER DEPARTMENT HAS BEEN A LEADER IN THE NATIONAL DISCUSSIONS LEADING UP TO THE NEW RULINGS AND IS PRESENTLY INSTITUTING CUSTOMER MONITORING PROGRAMS FOR LEAD AND COLIFORM. THERE EXISTS A CLEAR LINK BETWEEN EXPOSURE TO LEAD IN THE ENVIRONMENT AND THE ACCUMULATION OF LEAD IN THE BLOODSTREAM. IN ADULTS, LEAD EXPOSURE MAY RESULT IN HYPERTENSION, NERVOUS SYSTEM AND BEHAVIORAL DISORDERS; IN CHILDREN OR FETUSES IT MAY RETARD PHYSICAL AND NEUROLOGICAL DEVELOPMENT. AS RESEARCH CONTINUES, ADVERSE HEALTH EFFECTS ARE BEING DISCOVERED AT EVER LOWER BLOOD LEVELS, THUS RAISING THE CONCERN THAT FURTHER REDUCTIONS IN LEAD EXPOSURE ARE NEEDED. AS A RESULT, REDUCING SOURCES OF EXPOSURE TO ENVIRONMENTAL LEAD HAS BECOME A NATIONAL HEALTH PRIORITY.

LEAD IS EVERYWHERE - PRESENT IN AIR, SOIL, FOOD AND WATER, AS WELL AS IN MANY MAN-MADE PRODUCTS SUCH AS PAINT, GASOLINE AND BATTERIES. THE EPA HAS DEVELOPED A STRATEGY TO REDUCE LEAD EXPOSURE TO THE FULLEST EXTENT PRACTICABLE, WITH PARTICULAR EMPHASIS ON REDUCING THE RISK TO CHILDREN. THIS STRATEGY STARTED IN THE 1970S WITH THE PHASING OUT OF LEAD IN GASOLINE. TODAY, THE EPA CONSIDERS THE THREE MAJOR SOURCES OF LEAD EXPOSURE, IN ORDER OF SIGNIFICANCE, TO BE: LEAD-BASED PAINT, LEAD IN SOIL AND DUST, AND LEAD IN DRINKING WATER.

REGULATING LEAD LEVELS IN DRINKING WATER IS DIFFICULT DUE TO THE FACT THAT LEAD IS NOT TYPICALLY FOUND IN "SOURCE WATER," BUT AS A BYPRODUCT OF CORROSION IN THE DISTRIBUTION SYSTEM, OR, AS IS MOST OFTEN THE CASE, WITHIN THE PLUMBING SYSTEMS OF THE CUSTOMER PROPERTY. THEREFORE, THE MOST EFFECTIVE APPROACH TO REDUCE THE CONSUMPTION OF LEAD IN DRINKING WATER IS BY TREATING WATER TO MAKE IT LESS CORROSIVE TO LEAD PRODUCTS AND EDUCATING THE PUBLIC ABOUT THE HEALTH EFFECTS OF LEAD.



WATER IS VERY IMPORTANT
IN EVERY LIVING THINGS LIFE.
IN ALMOST EVERY FOOD THERE
IS WATER. THINGS CAN GO
WITHOUT FOOD FOR WEEKS, BUT
MOST PLANTS AND ANIMALS
CANNOT GO WITHOUT WATER
FOR A WEEK OR TWO.
UNCLEAN WATER CAN CAUSE
GREAT SICKNESS AND
DISEASE. WE CAN KEEP
WATER CLEAN BY NOT
THROWING GARBAGE IN
THE WATER.

SOPHIA, AGE 10



THE LEAD RULE



FINAL LEAD REGULATIONS FOR DRINKING WATER WERE RELEASED BY THE EPA IN JUNE 1991. PREVIOUSLY, THE ALLOWABLE LEAD LEVEL IN DRINKING WATER WAS AN AVERAGE OF 50 PARTS PER BILLION (PPB) MEASURED ANYWHERE IN A WATER DISTRIBUTION SYSTEM. THE GOAL OF THE NEW STANDARDS IS FOR AT LEAST 90 PERCENT OF MONITORED HOUSEHOLD DRINKING WATER TAPS TO HAVE LEAD LEVELS OF 15 PPB OR LESS, THE EPA'S NEW "ACTION LEVEL" FOR WATER SAMPLES TAKEN AT THE TAP. DRINKING WATER LEAD CONCENTRATIONS ARE HIGHEST AT THE TAP.

EPA'S ACTION FOCUSES ON THE MAIN CAUSE OF LEAD IN DRINKING WATER — CORROSION OF LEAD FROM PIPES, SOLDER AND FIXTURES WHICH LEACHES INTO THE WATER DURING ITS JOURNEY FROM THE TREATMENT PLANT TO THE CONSUMER'S TAP. THE MORE CORROSIVE THE WATER LEAVING THE TREATMENT PLANT, THE GREATER THE CHANCE THAT THIS WATER WILL LEACH LEAD FROM PLUMBING, CARRYING IT TO THE CONSUMER. WATER SUPPLIERS ACROSS THE NATION PRACTICE CORROSION CONTROL TO REDUCE THE AMOUNT OF LEAD AT THE CONSUMER'S TAP BY MINIMIZING THE CORROSIVITY OF WATER AT THE TREATMENT PLANT.

IN 1986, LEAD WAS BANNED FROM USE IN PIPE AND SOLDER FOR PUBLIC WATER SYSTEMS AND HOUSEHOLD PLUMBING AND LIMITED IN BRASS FIXTURES. ILLEGAL USE OF SOLDER DOES CONTINUE, HOWEVER. THE EPA IS CONSIDERING FURTHER RESTRICTIONS ON THE SALE OR MANUFACTURE OF LEAD SOLDER AND ON THE BRASS FIXTURES THAT CONTAIN LEAD.

THE NEW STANDARDS REQUIRE 79,000 PUBLIC WATER SUPPLIERS IN THE UNITED STATES TO MONITOR FOR LEAD AT HOUSEHOLD TAPS. TAP MONITORING WILL BE OF FIRST-DRAW WATER, WHICH CONTAINS THE MOST LEAD, AND WILL TAKE PLACE AT HIGH RISK HOMES: THOSE WITH NEW LEAD SOLDER (APPLIED SINCE 1982) OR WITH LEAD SERVICE LINES. CITIES WITH POPULATIONS OVER 100,000 WILL MONITOR 100 HIGH RISK HOMES TWICE A YEAR. LARGE WATER SYSTEMS, SUCH AS PHILADELPHIA, ARE REQUIRED TO BEGIN MONITORING BY JANUARY 1, 1992.



AT THE WATER TREATMENT
PLANT I LEARNED SOME NEW
THINGS LIKE HOW THEY CLEAN
THE WATER AND WHAT WATER
GOES THROUGH BEFORE WE USE
IT. WHEN OUR CLASS WENT UP
ON TOP OF THE BUILDING I SAW
ALL THE WATER. IT WAS NICE. I
NEVER KNEW WE HAD SO MUCH
WATER. IT WAS VERY BEAUTIFUL.

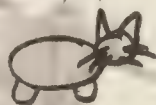
CANDICE, AGE 10





CLEAN WATER IS IMPORTANT TO PLANTS
AND ANIMALS BECAUSE ALL LIVING THINGS
NEED WATER TO SURVIVE. DIRTY WATER
WOULD SPREAD DISEASES. ALL THE PLANTS
WOULD DIE. THEN ALL THE ANIMALS WOULD
DIE OF STARVATION AND DISEASE.
THEN PEOPLE WILL DIE OF STARVATION
BECAUSE ALL OF THE ANIMALS AND PLANTS
DIED. WE WOULD SUFFOCATE TO DEATH
BECAUSE ALL OF THE PLANTS DIED AND PLANTS
PRODUCE OXYGEN. THAT IS WHY CLEAN
WATER IS IMPORTANT TO PLANTS AND ANIMALS.
IT KEEPS THE FOOD CHAIN LIVING AND ALSO
THE REST OF THE WORLD.

STEPHANIE, AGE 9





DRINKING WATER THAT ENTERS HOMES AND BUSINESSES FROM THE PHILADELPHIA WATER SYSTEM IS MOSTLY LEAD-FREE. PHILADELPHIA'S WATER DISTRIBUTION SYSTEM DOES NOT HAVE LEAD PIPES, BUT THE LINE THAT RUNS FROM THE WATER MAIN TO THE CUSTOMER'S HOME (THE SERVICE LINE) MAY BE MADE OF LEAD. IN FACT, THE PLUMBING SYSTEM IN THE HOME MAY HAVE LEAD SOLDER OR BRASS FIXTURES, WHICH CONTAIN LEAD. AS WATER STANDS IN YOUR PLUMBING, LEAD FROM SOLDERED JOINTS AND OLD LEAD PIPES CAN DISSOLVE INTO THE WATER. THE LONGER THE WATER STANDS IN THE PIPES, THE MORE LEAD CAN DISSOLVE INTO THE WATER.

OLD HOMES AND VERY NEW HOMES ARE MOST LIKELY TO HAVE HIGHER LEAD LEVELS IN THE WATER. HOMES BUILT AROUND THE TURN OF THE CENTURY HAD LEAD PIPES FOR PLUMBING, AND LEAD SERVICE LINES WERE COMMONLY INSTALLED UNTIL 1950. THESE PIPES MAY STILL PRODUCE HIGH LEAD LEVELS IN DRINKING WATER. PLUMBING IN NEWER HOMES, ON THE OTHER HAND, PROBABLY CONTAINS COPPER PIPES JOINED WITH LEAD SOLDER. THE LEAD IN THIS SOLDER DISSOLVES EASILY WHEN NEWLY INSTALLED, BUT DISSOLVES LESS AS IT GETS OLDER, SLOWLY REDUCING THE AMOUNT OF LEAD IN THE WATER.

THE PHILADELPHIA WATER DEPARTMENT INSTITUTED A CORROSION CONTROL PROGRAM YEARS AGO, ORIGINALLY AS A MEANS TO MAINTAIN THE DEPARTMENT'S 3,000 MILE WATER DISTRIBUTION SYSTEM. TWO OF THE DEPARTMENT'S WATER TREATMENT PLANTS USE ZINC ORTHOPHOSPHATE TO DETER CORROSION, WHILE ONE PLANT USES LIME. TWO YEARS AGO, IN ANTICIPATION OF THE LEAD RULING, THE WATER DEPARTMENT SET UP A SERIES OF EXPERIMENTAL PIPE RACKS AT SEVEN DIFFERENT LOCATIONS TO TEST THE EFFECTS OF VARIOUS PROPORTIONS OF ZINC ORTHOPHOSPHATE AND OTHER CHEMICALS TO MAXIMIZE CORROSION REDUCTION AND REDUCE LEAD LEACHING. THE DEPARTMENT IS STILL EXPERIMENTING WITH THESE PIPE RACKS AND WILL BE FOR SOME TIME.



WHEN WE VISITED THE WATER TREATMENT
PLANT THEY SHOWED AND TAUGHT US A LOT.
I LIKED MOSTLY HOW THEY CLEANED THE
WATER. WE LEARNED TO CONSIDER WATER IN
MANY DIFFERENT WAYS. WE ALSO LEARNED
THE PROCESS OF HOW WATER GETS TO AND
FROM OUR HOUSES, THE PROCESS OF CLEANING
WATER AND LOTS MORE.

VIRGINIA, AGE 10





AS OF NOW, THE NEW STANDARDS ALSO REQUIRE WATER SUPPLIERS TO GRADUALLY REPLACE ALL THEIR LEAD PIPE SERVICE LINES IF TAP WATER LEAD CONCENTRATIONS STILL EXCEED THE ACTION LEVEL AFTER CORROSION CONTROL HAS BEEN IN EFFECT FOR THREE YEARS. SYSTEMS HAVE 15 YEARS TO COMPLETE REPLACEMENT, BUT MAY DISCONTINUE THE PROCESS AT ANY TIME THE ACTION LEVEL IS MET. SERVICE LINES CONNECT HOUSEHOLD PLUMBING WITH THE WATER MAINS OF THE SUPPLIER.

SYSTEMS OF ALL SIZES THAT EXCEED THE 15 PPB ACTION LEVEL AT ANY TIME AFTER MONITORING BEGINS MUST INFORM CUSTOMERS EVERY SIX MONTHS HOW TO MINIMIZE DRINKING WATER LEAD EXPOSURE THROUGH PUBLIC EDUCATION PROGRAMS.

THESE PROGRAMS INCLUDE HELPING THE CUSTOMER DETERMINE IF THE HOME HAS A LEAD SERVICE AND HOW LEAD CAN BE ELIMINATED FROM THE CUSTOMER'S INTERNAL WATER SUPPLY. A QUICK LOOK OFTEN REVEALS THE PRESENCE OF LEAD PIPES OR SOLDER IN THE PLUMBING SYSTEM. LEAD IS A SOFT, GRAY METAL THAT SCRATCHES EASILY. THE SCRATCHES WILL BE A SHINY SILVER COLOR. LEAD SOLDER JOINTS CAN SOMETIMES BE IDENTIFIED IN THE SAME WAY. THE CUSTOMER CAN EASILY REDUCE EXPOSURE TO LEAD IN DRINKING WATER. SOME STEPS THE CUSTOMER CAN TAKE, IF TAKEN EACH DAY, CAN BRING DOWN LEAD LEVELS TO A POINT WHERE NO EXTRA ACTION IS NECESSARY. FLUSHING THE STANDING WATER FROM THE PLUMBING BY TURNING ON THE FAUCET IS THE EASIEST AND LEAST EXPENSIVE SHORT-TERM MEASURE. FLUSH THE COLD WATER PIPES BY RUNNING THE WATER UNTIL IT BECOMES AS COLD AS IT CAN GET ANY TIME THE WATER IN A PARTICULAR FAUCET HASN'T BEEN USED FOR SIX HOURS OR MORE. LETTING THE WATER RUN AN ADDITIONAL HALF MINUTE OR SO AFTER IT COOLS WILL ALSO FLUSH THE SERVICE LINE.



WHEN WE WENT TO THE WATER TREATMENT PLANT
WE SAW THE WATER WITH CHEMICALS AND WATER
BEFORE CHEMICALS. IT MADE ME NOT WANT TO
DRINK WATER AGAIN UNTIL I SAW THE WATER
RUN THROUGH THE FILTERS AND BECOME CLEAR.

RICKY, AGE 10





EARLY IN 1991, THE WATER DEPARTMENT BEGAN SOLICITING VOLUNTEERS TO PARTICIPATE IN ITS RESIDENTIAL LEAD MONITORING PROGRAM THROUGH AN AGGRESSIVE RECRUITMENT PROGRAM WHICH INVOLVED KNOCKING ON CUSTOMERS' DOORS, PHONE CALLS AND SENDING OUT LETTERS TO 4,700 PAST AND PRESENT EMPLOYEES AND INTERESTED CUSTOMERS. POTENTIAL VOLUNTEERS WERE ASKED TO FILL OUT A QUESTIONNAIRE REGARDING THE AGE OF THE HOME, IF THEY KNEW IF THEY HAD LEAD SERVICE LINES, AND IF THEY INSTALLED NEW KITCHEN WATER SUPPLY PLUMBING OR MADE REPAIRS TO EXISTING KITCHEN WATER SUPPLY PLUMBING. THE DEPARTMENT'S GOAL IS TO ESTABLISH A BASE SAMPLE GROUP OF 200 HOMES.

THE WATER SAMPLING PROGRAM FOR LEAD WILL BEGIN IN JANUARY 1992, AND VOLUNTEERS WILL BE TAKING WATER SAMPLES FROM THEIR KITCHEN SINKS ONCE EVERY SIX MONTHS. VOLUNTEERS WILL BE TRAINED HOW TO TAKE AND STORE THE SAMPLES. WATER SAMPLES WILL BE TAKEN AFTER THE WATER HAS BEEN STANDING UNUSED IN THE PIPES FOR SIX OR MORE HOURS. THE WATER DEPARTMENT WILL BE PROVIDING CONTAINERS FOR THE SAMPLES AND WILL PICK UP THE SAMPLES AT A TIME CONVENIENT FOR OUR VOLUNTEERS. THE WATER SAMPLES WILL BE ANALYZED FOR LEAD LEVELS TWICE A YEAR, WITH THE VOLUNTEERS RECEIVING THE RESULTS. IF MORE THAN 10 PERCENT OF THE HOME TAPS TESTED SHOW LEAD IN EXCESS OF THE EPA'S "ACTION LEVEL" OF 15 PARTS PER BILLION (PPB), THE WATER DEPARTMENT, AS OTHER UTILITIES ACROSS THE COUNTRY, WILL BE REQUIRED TO STEP UP ITS CORROSION CONTROL PROGRAM AND EDUCATE THE PUBLIC ABOUT LEAD IN DRINKING WATER.



WATER IS IMPORTANT BECAUSE
WITHOUT OUR WATER THERE
WOULDN'T BE ANY LIFE ON
EARTH. WE NEED WATER TO GET
CLEAN AND TO COOL OFF LIKE
WHEN YOUR HOT AND IT IS ONE
HUNDRED DEGREES, YOU WANT
TO JUMP IN A POOL. WE ALSO NEED
WATER FOR FLUID. WE NEED CLEAN
WATER SO WE WILL NOT GET SICK BY
THE DISEASES THAT SOME PEOPLE GET
FROM DIRTY WATER.

JOHN, AGE 9





THE REVISED RULE FOR TOTAL COLIFORM BACTERIA BECAME EFFECTIVE DECEMBER 31, 1990. A NUMBER OF STATES, INCLUDING PENNSYLVANIA, ARE NOT YET ENFORCING THE NEW RULE DUE TO DELAYS IN PROMULGATING THEIR OWN STANDARDS AND IN GEARING UP FOR ENFORCEMENT ACTIVITIES. PENNSYLVANIA IS EXPECTED TO ASSUME ENFORCEMENT RESPONSIBILITY IN THE NEAR FUTURE.

COLIFORM OCCURRENCES IN THE DISTRIBUTION SYSTEM MAY LEAD TO A VIOLATION OF THE NEW COLIFORM RULE EVEN THOUGH A DEMONSTRATABLE PUBLIC HEALTH RISK MAY NOT EXIST. AT THE TIME THE RULE WAS PROMULGATED, VARIANCES AND EXEMPTIONS WERE NOT ALLOWED BY EPA. THIS MEANS THAT A PERSISTENT PROBLEM WITH COLIFORM GROWTH IN THE DISTRIBUTION SYSTEM COULD CAUSE A SYSTEM TO BE IN CONTINUAL NONCOMPLIANCE WITH THE RULE, NECESSITATING REPEATED PUBLIC NOTICES, EVEN THOUGH NO FECAL OR PATHOGENIC BACTERIAL CONTAMINATION EXISTED.

THE TOTAL COLIFORM RULE, LIKE LEAD, HAS ALSO NECESSITATED A CUSTOMER RECRUITMENT PROGRAM WHICH HAS BEEN VERY SUCCESSFUL. THE DEPARTMENT'S GOAL OF OBTAINING A MINIMUM OF FOUR ALTERNATE SAMPLING POINTS FOR EACH OF THE DEPARTMENT'S 85 ROUTINE SAMPLING LOCATIONS WAS ACCOMPLISHED THROUGH AN AGGRESSIVE RECRUITMENT PROGRAM WHICH INVOLVED KNOCKING ON CUSTOMERS' DOORS, PHONE CALLS AND LETTERS.

INITIALLY, A LIST OF 10 ALTERNATE SAMPLING POINTS, WITHIN FIVE SERVICE CONNECTIONS FOR EACH EXISTING SAMPLING LOCATION, WAS DEVELOPED. POTENTIAL CUSTOMER VOLUNTEERS RECEIVED WRITTEN MATERIAL ON WATER QUALITY AND TREATMENT, AND A Q&A REGARDING THE COLIFORM MONITORING PROGRAM. A DEPARTMENT TEAM CONSISTING OF AN EMPLOYEE FROM THE BUREAU OF LABORATORY SERVICES AND AN EMPLOYEE FROM OUR PUBLIC AFFAIRS DIVISION THEN VISITED THE CUSTOMER, TO DESCRIBE THE PROGRAM IN FURTHER DETAIL AND TO PERSONALIZE THEIR PARTNERSHIP WITH US IN THE PROJECT.

TOTAL COLIFORM



ONCE EVERY THREE MONTHS, OUR COLIFORM TEAMS COLLECT THE CUSTOMER'S WATER SAMPLE FROM THE FAUCET THAT IS CLOSEST TO THEIR WATER METER, WHICH SUPPLIES WATER THAT IS MOST LIKE THE WATER ENTERING THEIR HOME FROM THE WATER MAIN. USUALLY, THIS IS THE FAUCET IN THE KITCHEN, BATHROOM OR UTILITY SINK. THE TEAM INSPECTS THE FAUCET TO ENSURE IT MEETS SAMPLING REQUIREMENTS, AND ALLOWS THE WATER TO RUN FOR AT LEAST THREE MINUTES TO FLUSH THE PIPES AND GUARANTEE THAT THE WATER BEING SAMPLED IS SIMILAR TO THE WATER IN THE WATER MAIN.

THE TEAM EXPLAINS TO THE CUSTOMER THAT WE ARE LOOKING FOR ANY CHANGES WHICH OCCUR FROM THE TIME THE WATER LEAVES OUR WATER TREATMENT PLANTS UNTIL IT REACHES THEIR HOME. THE TESTS MEASURE: PH, TURBIDITY, CHLORINE, ALKALINITY, AND COLIFORMS. COLIFORM BACTERIA ARE MICROSCOPIC ORGANISMS WHICH OCCUR NATURALLY IN SOIL AND IN THE INTESTINES OF MAN AND OTHER WARM-BLOODED ANIMALS. COLIFORMS THEMSELVES DO NOT CAUSE DISEASE, BUT WHEN FOUND IN WATER, THEIR PRESENCE INDICATES THE POSSIBLE PRESENCE OF OTHER DISEASE-CAUSING MICROSCOPIC ORGANISMS.

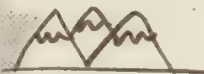
THE COLIFORM TEAM IS SPECIFICALLY TRAINED TO FOLLOW A RIGID ROUTINE WHEN COLLECTING THE SAMPLE. THE TEAM ENSURES THAT THE SAMPLES ARE MOST LIKE THE EXISTING WATER CONDITIONS IN THE WATER MAIN AND THAT THE SAMPLES ARE NOT CONTAMINATED DURING THE SAMPLING PROCEDURE. CUSTOMERS WILL RECEIVE WRITTEN RESULTS WITHIN ONE MONTH OF EACH SAMPLE AND WILL BE NOTIFIED IMMEDIATELY OF ANY UNUSUAL RESULTS.

THE PHILADELPHIA WATER DEPARTMENT ENCOURAGES CLOSE INTERACTION BETWEEN THE STATE AND PUBLIC WATER SUPPLIERS ON THE FUTURE IMPLEMENTATION OF THE TOTAL COLIFORM RULE. IN RECOGNITION OF THE IMPORTANCE OF THIS ISSUE, WE WILL CONTINUE TO WORK IN THE FOREFRONT OF MAINTAINING AND ENSURING HIGH WATER QUALITY.



I LIKED THE WATER TREATMENT
PLANT FIELD TRIP BECAUSE YOU
GOT TO EXPERIENCE HOW WATER IS
CLEANED AND HOW IT GOES IN
YOUR FAUCET SO YOU CAN DRINK
IT. I ALSO LEARNED THAT WATER IS
VERY IMPORTANT. WHILE WE WERE
AT THE WATER TREATMENT PLANT,
THE WATER LOOKED LIKE ICE TEA
BEFORE IT WAS FILTERED. IT WAS
VERY COOL.

LISA, AGE 10





WATER TREATMENT PLANTS



WASTEWATER TREATMENT PLANTS



SLUDGE RECYCLING CENTER



WHOLESALE CUSTOMERS

130 SQ. MI. WATER SERVICE AREA

279 SQ. MI. WASTEWATER SERVICE AREA

1.74 MILLION WATER POPULATION SERVED

2.29 MILLION WASTEWATER POPULATION SERVED

3 WATER TREATMENT PLANTS

15 WATER PUMPING STATIONS

3 WASTEWATER TREATMENT PLANTS

16 WASTEWATER PUMPING STATIONS

1 SLUDGE RECYCLING CENTER

348.6 MGD AVERAGE DRINKING WATER DELIVERED

486.8 MGD AVERAGE WASTEWATER TREATED

3,274 MILES OF WATER MAIN

2,956 MILES OF SEWER

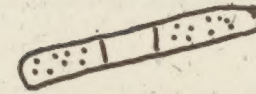
27,783 NUMBER OF FIRE HYDRANTS

84,590 NUMBER OF MANHOLES

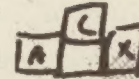
75,000 NUMBER OF STORMWATER INLETS

FISCAL YEAR 1991 SERVICE ACCOMPLISHMENTS

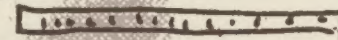
605 WATER MAINS REPAIRED



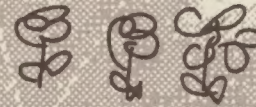
83 SEWERS RECONSTRUCTED



14,564 METERS REPLACED



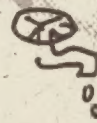
355,000 TONS SLUDGE PROCESSED



6,249 HYDRANTS REPAIRED



513 VALVES INSTALLED



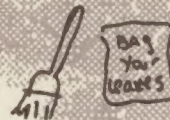
635 LEAKS ABATED



3,546 FERRULES INSTALLED



65,645 INLETS CLEANED



FINANCIALS

SUPPLEMENTAL SCHEDULE OF RATE COVENANT COMPLIANCE FOR THE FISCAL YEAR ENDED JUNE 30, 1991

(AMOUNTS IN THOUSANDS OF DOLLARS) (LEGALLY ENACTED BASIS)

PURSUANT TO SECTION 4.03 (B) OF THE GENERAL WATER AND SEWER REVENUE BOND ORDINANCE OF 1974 (BILL NO. 1263), THE CITY IS REQUIRED TO IMPOSE, CHARGE AND COLLECT IN EACH FISCAL YEAR RATES AND CHARGES AT LEAST SUFFICIENT, TOGETHER WITH THAT PORTION OF THE UNENCUMBERED AMOUNT OF THE OPERATING FUNDS BALANCES AVAILABLE AND RESERVED FOR APPROPRIATION FOR THE PAYMENT OF OPERATING EXPENSES AT THE COMMENCEMENT OF SUCH FISCAL YEAR, WHICH TOGETHER WITH ALL OTHER PROJECT REVENUES TO BE RECEIVED IN SUCH FISCAL YEAR, SHALL EQUAL NOT LESS THAN THE GREATER OF:

A. THE SUM OF:

- (I) ALL NET OPERATING EXPENSES PAYABLE DURING SUCH FISCAL YEAR;
- (II) 150% OF THE AMOUNT REQUIRED TO PAY THE PRINCIPAL OF AND INTEREST ON ALL BONDS ISSUED AND OUTSTANDING HEREUNDER WHICH WILL BECOME DUE AND PAYABLE DURING SUCH FISCAL YEAR; AND
- (III) THE AMOUNT, IF ANY, REQUIRED TO BE PAID INTO THE SINKING FUND RESERVE DURING SUCH FISCAL YEAR; OR

B. THE SUM OF:

- (I) ALL OPERATING EXPENSES PAYABLE DURING SUCH FISCAL YEAR; AND
- (II) ALL SINKING FUND DEPOSITS REQUIRED DURING SUCH FISCAL YEAR IN RESPECT OF ALL OUTSTANDING BONDS AND IN RESPECT OF ALL OUTSTANDING GENERAL OBLIGATION BONDS ISSUED FOR IMPROVEMENTS TO THE WATER OR SEWER SYSTEMS AND ALL AMOUNTS, IF ANY REQUIRED DURING SUCH FISCAL YEAR TO BE PAID INTO THE SINKING FUND RESERVE.

COVERAGE IS COMPUTED AS FOLLOWS:

COVERAGE A

LINE 4	93,437,852
+ LINE 12	30,991,991
+ LINE 18	0
	124,429,844
/ LINE 5	(97,130,829)
= COVERAGE A	1.28

COVERAGE B

LINE 4	93,437,852
+ LINE 12	30,991,991
- LINE 13	(30,482,002)
+ LINE 18	0
	93,947,842
/ LINE 7	(108,571,821)
= COVERAGE B	0.87

LINE NO.

1. TOTAL OPERATING REVENUE	\$254,063,054
2. NET OPERATING EXPENSE	(149,180,202)
3. BOND ANTICIPATION NOTES	(11,445,000)
4. NET OPERATING REVENUE AFTER NOTES	93,437,852

DEBT SERVICE

5. REVENUE BONDS OUTSTANDING	(97,130,829)
6. GENERAL OBLIGATION BONDS OUTSTANDING	(11,440,992)
7. TOTAL DEBT SERVICE ON BONDS	(108,571,821)
8. NET OPERATING REVENUE AFTER BONDS	(15,133,969)

NONOPERATING INCOME

9. INTEREST INCOME	9,533,120
10. GRANT INCOME	4,825,650
11. TRANSFER IN FROM RENEWAL AND REPLACEMENT FUND	16,633,222
12. TOTAL NONOPERATING INCOME	30,991,991

OTHER OBLIGATIONS

13. DIRECT INTERDEPARTMENTAL CHARGES	(30,482,002)
14. TRANSFER OF INTEREST INCOME TO GENERAL FUND	0
15. TRANSFERS TO THE RENEWAL AND REPLACEMENT FUND	0
16. TOTAL OTHER OBLIGATIONS	(30,482,002)
17. NET OPERATING DEFICIT FOR CURRENT YEAR	(14,623,979)
18. NET BALANCE AT BEGINNING OF FISCAL YEAR	0
19. NET DEFICIT AT END OF FISCAL YEAR	(\$14,623,979)



PHILADELPHIA WATER DEPARTMENT
ARA TOWER AT READING CENTER
1101 MARKET STREET
PHILADELPHIA, PA 19107-2994

